**Boscheri, Walter**; **Loubère, Raphaël**

**High order accurate direct arbitrary-Lagrangian-Eulerian ADER-MOOD finite volume schemes for non-conservative hyperbolic systems with stiff source terms.** (English)

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Summary: We present a 2D/3D high order accurate finite volume scheme in the context of direct Arbitrary-Lagrangian-Eulerian algorithms for general hyperbolic systems of partial differential equations with non-conservative products and stiff source terms. This scheme is constructed with a single stencil polynomial reconstruction operator, a one-step space-time ADER integration which is suitably designed for dealing even with stiff sources, a nodal solver with relaxation to determine the mesh motion, a path-conservative integration technique for the treatment of non-conservative products and an a posteriori stabilization procedure derived from the so-called Multidimensional Optimal Order Detection (MOOD) paradigm. In this work we consider the seven equation Baer-Nunziato model of compressible multi-phase flows as a representative model involving non-conservative products as well as relaxation source terms which are allowed to become stiff. The new scheme is validated against a set of test cases on 2D/3D unstructured moving meshes on parallel machines and the high order of accuracy achieved by the method is demonstrated by performing a numerical convergence study. Classical Riemann problems and explosion problems with exact solutions are simulated in 2D and 3D. The overall numerical code is also profiled to provide an estimate of the computational cost required by each component of the whole algorithm.

**MSC:**

65M08 Finite volume methods for initial value and initial-boundary value problems involving PDEs



**Full Text:** DOI